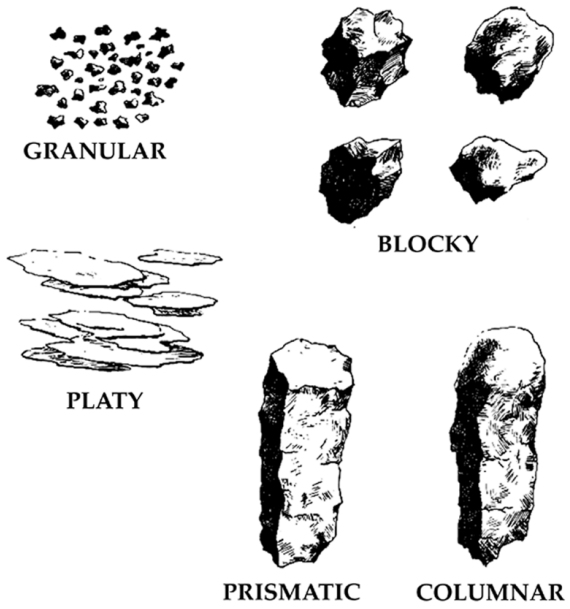
Soil Investigation

Soil Characterization Information Sheet

A: Soil Structure

Take a sample of undisturbed soil in your hand (either from the pit or from the shovel or auger). Look closely at the soil in your hand and examine its structure. Soil structure is the shape that the soil takes based on its physical and chemical properties. Each individual unit of soil structure is called a ped. Some possible choices of soil structure are:



Choices of Soil Structure

Sometimes, your soil may be structureless, which means that within a horizon, soil peds may not have a shape. In this case, the soil structure may be single grained or massive. Single grained is like sand at a beach or in a playground where there are individual sand particles that do not stick together. Massive is when the soil sticks together in a large mass that does not break in any pattern.

It is common to see more than one type of structure in a soil sample. Record on your data sheets only the structure type that is most common in your sample. Discuss and agree upon the main structure type you see. If the sample is structureless, record whether it is single-grained or massive.

B: Soil Color

Take a ped from each horizon and note on the data sheet whether it is moist, dry, or wet. If it is dry, moisten it slightly with water from your water bottle. Break the ped and compare the color of the inside surface with the soil color chart. Stand with the sun over your shoulder so that sunlight shines on the color chart and the soil sample you are examining. Record on the data sheet the code (letter and number) of the color on the chart that most closely matches the soil's color. Sometimes, a soil sample may have more than one color. Record a maximum of two colors if necessary, and indicate (1) the Main Color, and (2) the Second Color. Again, reach an agreement on these colors.

C: Soil Consistence

Take a ped from the soil horizon. Record on the data sheet whether the ped is moist, wet or dry. If the soil is very dry, moisten the face of the profile using a water bottle with a squirt top, and then remove a ped for determining consistence. Holding it between your thumb and forefinger, gently squeeze it until it pops or falls apart. Record one of the following categories of soil ped consistence on the data work sheet.

Loose: You have trouble picking out a single ped and the structure falls apart before you handle it.

Friable: The ped breaks with a small amount of pressure.

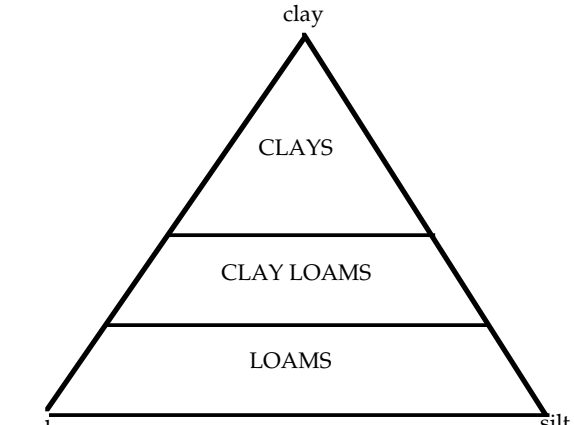
Firm: The ped breaks when you apply a good amount of pressure and dents your fingers before it breaks.

Extremely Firm: The ped can not be crushed with your fingers (you need a hammer!).

D: Soil Texture

The texture of a soil describes the way the soil feels when you rub it between your fingers. The texture differs depending on the size of the particles in the soil. Sand, silt, and clay are names that describe the size of individual particles in the

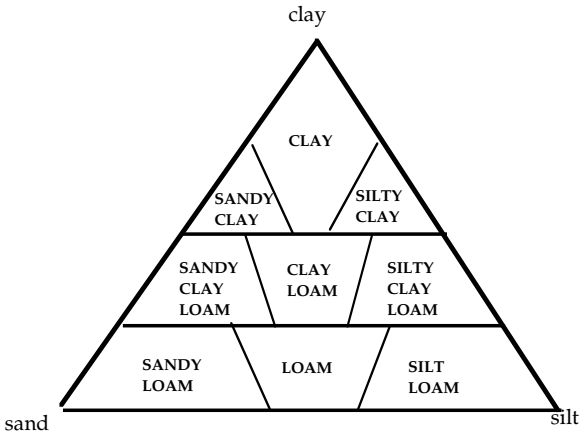
soil. Sand is the largest size and feels gritty to touch. Silt is medium size and feels *floury* or silky. Clay is the smallest size particle and feels sticky or hard to squeeze. It is more common to find a combination of these different particle sizes in a soil sample. Use the following procedure and the 2 textural triangles below to determine the texture name of each soil horizon in the profile.



Textural Triangle 1

1. Take a sample of soil about the size of a golf ball and add enough water to moisten it. Work it between your fingers until it is the same moisture throughout. Then, squeeze it between your thumb and forefinger in a snapping motion to try to form a ribbon of soil.
2. Refer to Textural Triangle 1 and feel for clay. Clay feels extremely sticky (sticks to your hands and is hard to work), is stiff and requires a lot of thumb and finger pressure to form a ribbon. If this is what your sample feels like, it should be classified as a clay, as shown on Textural Triangle 1.
3. If the soil feels slightly sticky and a little softer to squeeze, it is classified as a clay loam on Textural Triangle 1 and consists of clay, silt and sand particles.
4. If the soil is soft, smooth, and easy to squeeze, it is classified as a loam on Textural Triangle 1.

Next, refine your texture name using Textural Triangle 2:



Textural Triangle 2

1. Feel the same soil sample, but focus on the feeling of sand. If the soil feels very smooth, with no sandy grittiness, add either the word silt or silty to your classification (from Textural Triangle 1), such as silty clay, as shown on Textural Triangle 2. This means that your soil sample has more silt-size particles than sand-size particles.
2. If the soil feels very gritty, add the term sandy to your original soil classification (from Textural Triangle 1), such as sandy clay, as shown on Textural Triangle 2. This means your soil sample has more sand size particles than silt size particles.
3. If you feel some sand, but not a lot, this means it has approximately the same amounts of sand and silt size particles. Your original classification from Textural Triangle 1 (clay, clay loam, or loam) remains the same.

The soil texture can also feel different depending on how wet or dry it is, how much organic matter is in it, and the kind of clay minerals in it. When feeling the soil texture, be sure to add the same amount of water to each soil sample so that you can more accurately compare textures to each other.

Record on the data work sheet the name of the soil texture that the students agree on. If it is close between two different types of texture, list both. Also, note whether the sample was dry, wet, or moist when it was examined.

E. Presence of Roots

Observe and record if there are none, few, or many roots in the horizon

F. Presence of Rocks

Observe and record if there are none, few, or many rocks in the horizon. A rock is defined as being larger than 2 mm in size.

G. Test for Free Carbonates

Perform this test by squirting vinegar on the soil. If carbonates are present, there will be a chemical reaction between the vinegar and the carbonates to produce carbon dioxide. When carbon dioxide is produced, it bubbles or *effervesces*. The more carbonates that are present, the more bubbles (*effervescence*) you will observe.

1. Look carefully at your soil profile for white coatings on the soil and rocks which might indicate that free carbonates are present.
2. Set aside a portion of the pit or sample from the auger hole which you do not touch with your hands and use it for the free carbonates test.
3. After you have finished characterizing the other soil properties, test for free carbonates. Open the acid bottle and starting from the bottom of the profile and moving up, squirt vinegar on the soil particles. Observe carefully for the presence of effervescence.
4. For each horizon record one of the following as the results of the Free Carbonate Test:
   - None: if you observe no reaction, the soil has no free carbonates present.
   - Slight: if you observe a very slight bubbling action; this indicates the presence of some carbonates.
   - Strong: if there is a strong reaction (many, large bubbles) this indicates that many carbonates are present.
5. If you used the auger technique, place the sample back into the hole when you are finished. Do not bring it back to the classroom.